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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/595,289	04/05/2006	Masakazu Tani	36856.1432	6910
54066 7590 04/25/2008 MURATA MANUFACTURING COMPANY, LTD. C/O KEATING & BENNETT, LLP 8180 GREENSBORO DRIVE SUITE 850 MCLEAN, VA 22102				
EXAMINER				
SUMMONS, BARBARA				
ART UNIT		PAPER NUMBER		
2817				
NOTIFICATION DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/595,289

Applicant(s)

TANI, MASAKAZU

Examiner

BARBARA SUMMONS

Art Unit

2817

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 April 2006 (pre-amendment).
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-19 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 8-19 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 05 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB-08)
Paper No(s)/Mail Date 4/5/06 & 4/10/07.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The replacement drawings were received on 4/5/2006. These drawings are approved.

Specification

2. The substitute specification filed 4/5/2006 has been approved and entered.

Claim Objections

3. Claims 16 and 17 are objected to because of the following informalities:
4. In claim 16, on line 3, "portions" should be the singular -- portion --.
5. In claim 17, on line 3, "portions" should be the singular -- portion --.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 8 and 10-19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Shibata et al. U.S. 2002/0145361 (cited by Applicant) taken alone.

Regarding claims 8 and 15-19, Fig. 21 of Shibata et al. discloses a balanced-type surface acoustic wave (SAW) filter with balanced/unbalanced conversion including an

unbalanced terminal connected to the upper SAW filter track and first and second balanced terminals connected to the lower SAW filter track, the SAW filter comprising: a piezoelectric substrate of $40\pm 5^\circ$ Y-cut, X-propagating lithium tantalate (see section [0158]); a first longitudinally coupled resonator-type SAW filter portion in the first upper track having first to third interdigital transducers (IDTs) disposed along a SAW propagation direction (left-to-right in the figure), the middle IDT being connected to the unbalanced signal terminal, and two reflectors disposed at both sides of the first to third IDTs; and a second longitudinally coupled resonator-type SAW filter portion in the second lower track that is cascade connected to the first SAW filter portion in the upper track, the second SAW filter portion having fourth to sixth IDTs with reflectors disposed on both sides thereof, the fourth IDT connected to the first IDT by a signal line 1501, and the fifth middle IDT connected to the first and second balanced terminals; wherein electric signals passing through the signal line 1501 is about 180° different in phase from an electric signal passing through a signal line 1502 connecting the third IDT to the sixth IDT (see section [0193]). Regarding claim 14, Shibata et al. discloses providing an even number of electrode fingers in the fifth middle IDT of the second SAW filter connected to the first and second balanced terminals (see section [0195]). Regarding claim 13, Shibata discloses that the areas between adjacent IDTs have narrow pitched electrode finger portions (see e.g. Figs. 29 and 33 and sections [0209], [0214]-[0218] and [0252]-[0256]). Regarding claims 8 and 10-12, Shibata et al. discloses that there is a weighting applied in the area of adjacent IDTs (see Fig. 21 in the lower second SAW filter portion and see Figs. 4 and 48) that comprises a plurality of electrode fingers including the outermost electrode finger (see section [0029]) and which can be cross-

width (i.e. apodization) weighting (see e.g. the abstract, the last sentence thereof and section [0178]) or series weighting (see e.g. Fig. 24 and sections [0199]-[0200]).

However, in Fig. 21 shows the area of adjacent IDTs in the second SAW filter portion having the weighting of a plurality of electrode fingers rather than the first SAW filter portion of the upper track where either the first and second or the second and third IDTs are adjacent.

Shibata does disclose in another embodiment being Fig. 33 that it would have been known to provide the weighting in the areas of adjacent IDTs in the first filter track connected to the unbalanced terminal (see the areas in the ovals) vs. in the second filter track connected to the balanced terminals (see Fig. 37 the areas in the ovals). That is, because the weighted areas are to provide better amplitude and phase balance levels (see e.g. section [0028]), it would have been obvious to one of ordinary skill in the art to apply such areas to the first track in order to provide better balance between the 180° phase offset lines 1501 and 1502 as well as better phase balance between the balanced signal terminals.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the SAW filter of Shibata et al. (Fig. 21) such that the areas between the first and second or the second and third IDTs of the first SAW filter portion of the upper track, because such an obvious modification would have provided better amplitude and phase balance between lines 1501 and 1502 as suggested by Shibata et al. (see section [0028]), and because one of ordinary skill in the art would have known that in cascaded SAW filters with first and second filter portions, either of the filter portions may have the weighted areas to improve the

amplitude and phase balance as implicitly suggest by Shibata Figs. 33 and 37 (areas in ovals are weighted), since Fig. 33 weights the first filter portion of the first filter track connected to the unbalanced terminal and Fig. 37 shows the known alternative of weighting the second filter portion of the second filter track connected to the balanced terminals, and because Shibata explicitly suggests that the embodiments shown are not the only embodiments such that modifying Fig. 21 to have the first filter portion/track adjacent IDT areas weighted rather than second filter portion/track adjacent IDT areas, would have been a modification "apparent to those skilled in the art" (see section [0404]) based on the teachings of Fig. 33 vs. Fig. 37.

8. Claims 8-19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Strauss U.S. 6,667,673 in view of Shibata et al. U.S. 2002/0145361 (both cited by Applicant).

Regarding claims 8 and 15-18, Fig. 3 of Strauss discloses a balanced-type SAW filter having a balanced to unbalanced conversion function when the two IN terminals are connected as having the first option of unbal. and ground (i.e. rather than the second options of bal. and bal.), comprising: a piezoelectric substrate (not shown, see col. 1, lines 12-15); a first longitudinally coupled SAW resonator filter portion with first to third IDTs 21, 11, 22, the second IDT 11 connected to the unbalanced input terminal, and reflectors 31 on each side of the IDTs; and a second longitudinally coupled SAW resonator filter portion cascade connected to the first SAW filter portion, and having fourth to sixth IDTs 121, 111, 122, and reflectors 31 on each side of the IDTs, the fourth IDT 121 connected to the first IDT 21, and the fifth IDT 111 connected to first and

second balanced output terminals; and wherein an electric signal passing through the signal line connecting the fourth IDT 121 and the first IDT 21 is about 180° different in phase from an electric signal passing through a signal line connecting the third IDT 22 and the sixth IDT 122 vs. Fig. 2 wherein the filters are coupled in-phase (see col. 3, lines 60-66). Regarding claim 14, the fifth IDT 111 has an even number of electrode fingers (see col. 3, lines 46-49). Regarding claim 9, the first and second IDTs 21 and 11 have outermost adjacent electrode fingers of the same polarity since they are both signal electrode fingers, while the second and third IDTs 11 and 22 have outermost adjacent fingers being a ground finger and a signal finger respectively.

However, Strauss does not disclose weighting an IDT in an area where two IDTs 21/11 or 11/22 are adjacent in the first SAW filter portion by weighting a plurality of electrode fingers including an outermost electrode finger (claim 8) using length weighting (claim 10) including cross-width/apodization weighting (claim 11) or series weighting (claim 12), and also does not disclose narrow pitch electrode finger portions (claim 13) or the specific piezoelectric substrate cut angle (claim 19).

As discussed above, Shibata et al. discloses that it would have been known to provide weighting in the areas of adjacent IDTs, comprising weighting a plurality of electrode fingers including an outermost electrode finger to provide improved amplitude and phase balance (see sections [0028] and [0029]) in similar SAW filters with balanced to unbalanced conversion, and that such weighting includes both length weighting by apodization (see section [0041]) or series weighting (see section [0043] and Fig. 24). Shibata et al. also discloses that the piezoelectric substrate with the specified cut angle would have been well known (see section [0158]), as would having provided narrow

pitch electrode finger portions (see Figs. 29 and 33 and sections [0209], [0214]-[0218] and [0252]-[0256]), which one of ordinary skill in the art would have known to provide the benefit of reduced scattering losses at the juncture between IDTs as evidence by other prior art of record (see e.g. Bauer et al. U.S. 6,420,946 also cited by Applicant).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the SAW filter of Strauss (Fig. 3) by having provided it with a weighting of a plurality of electrode fingers including the outermost electrode finger of one of the IDTs where IDTs 21/11 and IDTs 11/22 are adjacent, as suggested by the exemplary teaching thereof by Shibata (see sections [0028]-[0029]), because such an obvious modification would have provided the benefit of improved amplitude and phase balance in a SAW filter with unbalanced to balanced conversion as explicitly suggested by Shibata (ibid.), and wherein also providing narrow pitched electrode finger portions at the areas of adjacent IDTs 21/11 and 11/22 and a $40\pm5^\circ$ Y-cut, X-propagating lithium tantalate substrate, as suggested by the exemplary teaching thereof by Shibata (see the immediately preceding paragraph), would have been obvious modifications to one of ordinary skill in the art at the time of the invention that, respectively, would have provided the benefit of reduced scattering losses between adjacent IDTs, and would have been merely a well known art recognized alternative piezoelectric substrate, as would have been known by one of ordinary skill in the art (see other art of record as evidence Bauer and Shibata section [0158], respectively).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Takamine U.S. 2003/0164745 discloses series weighting of IDTs in areas where two IDTs are adjacent that includes the outermost electrode finger (see Figs. 37 & 38).

Takamine et al. U.S. 2004/0080385 also discloses such series weighting including the outermost electrode finger (see Fig. 25) and shows cascade connecting SAW longitudinally coupled filters (see Figs. 2 and 26-29).

Shibahara et al. U.S. 2004/0196119 also discloses series weighting of the area between adjacent IDTs including the outermost electrode finger (see Fig. 1).

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BARBARA SUMMONS whose telephone number is (571)272-1771. The examiner can normally be reached on M-Th, M-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 271-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

bs
April 21, 2008

/Barbara Summons/
Primary Examiner, Art Unit 2817